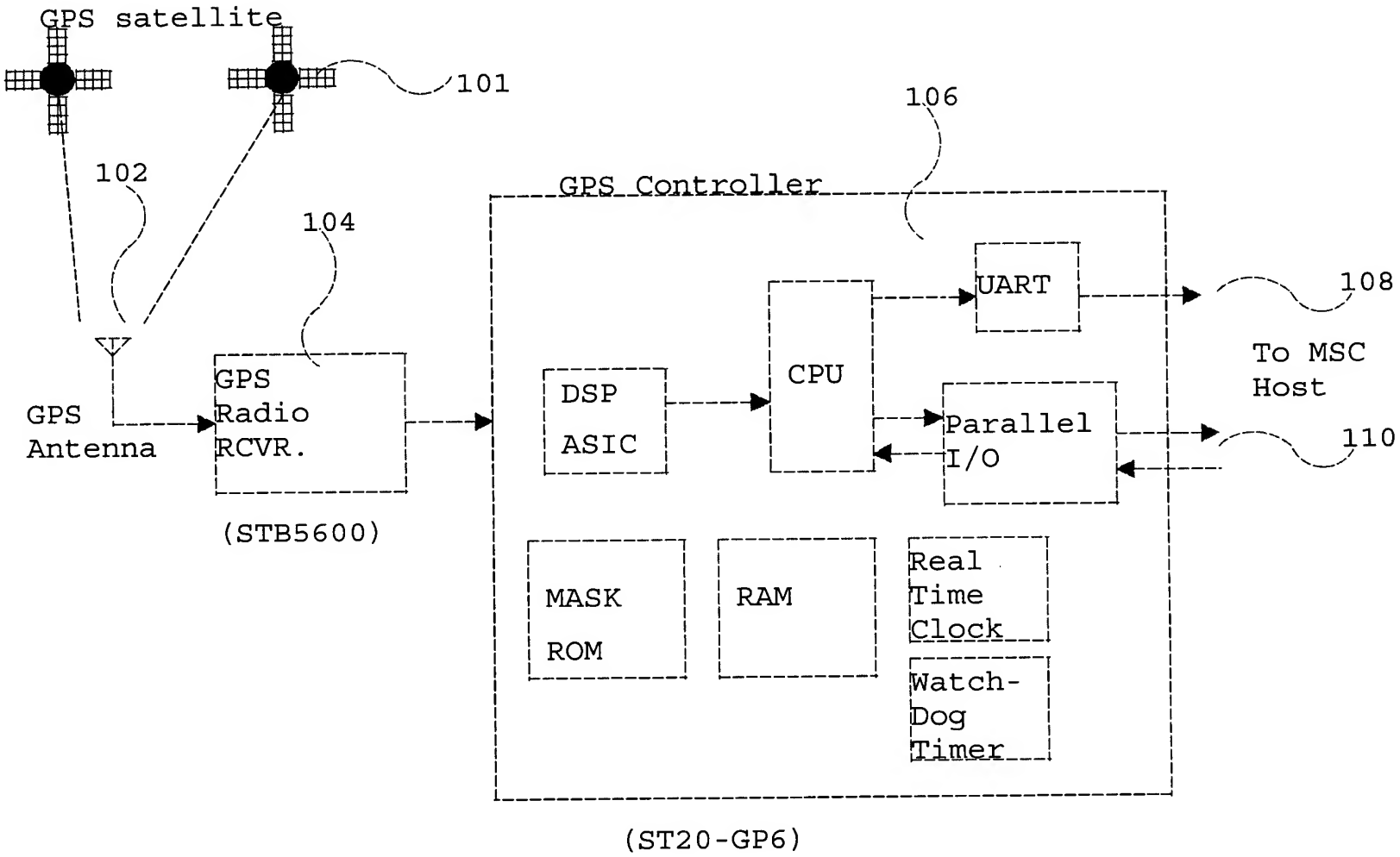
GPS satellite
101
106
102
GPS Controller
104
UART
108
To MSC
Host
CPU
DSP
ASIC
GPS
Antenna
GPS
Radio
RCVR.
Parallel
I/O
110
(STB5600)
MASK
ROM
RAM
Real
Time
Clock
Watch-
Dog
Timer
(ST20-GP6)

Fig. 1

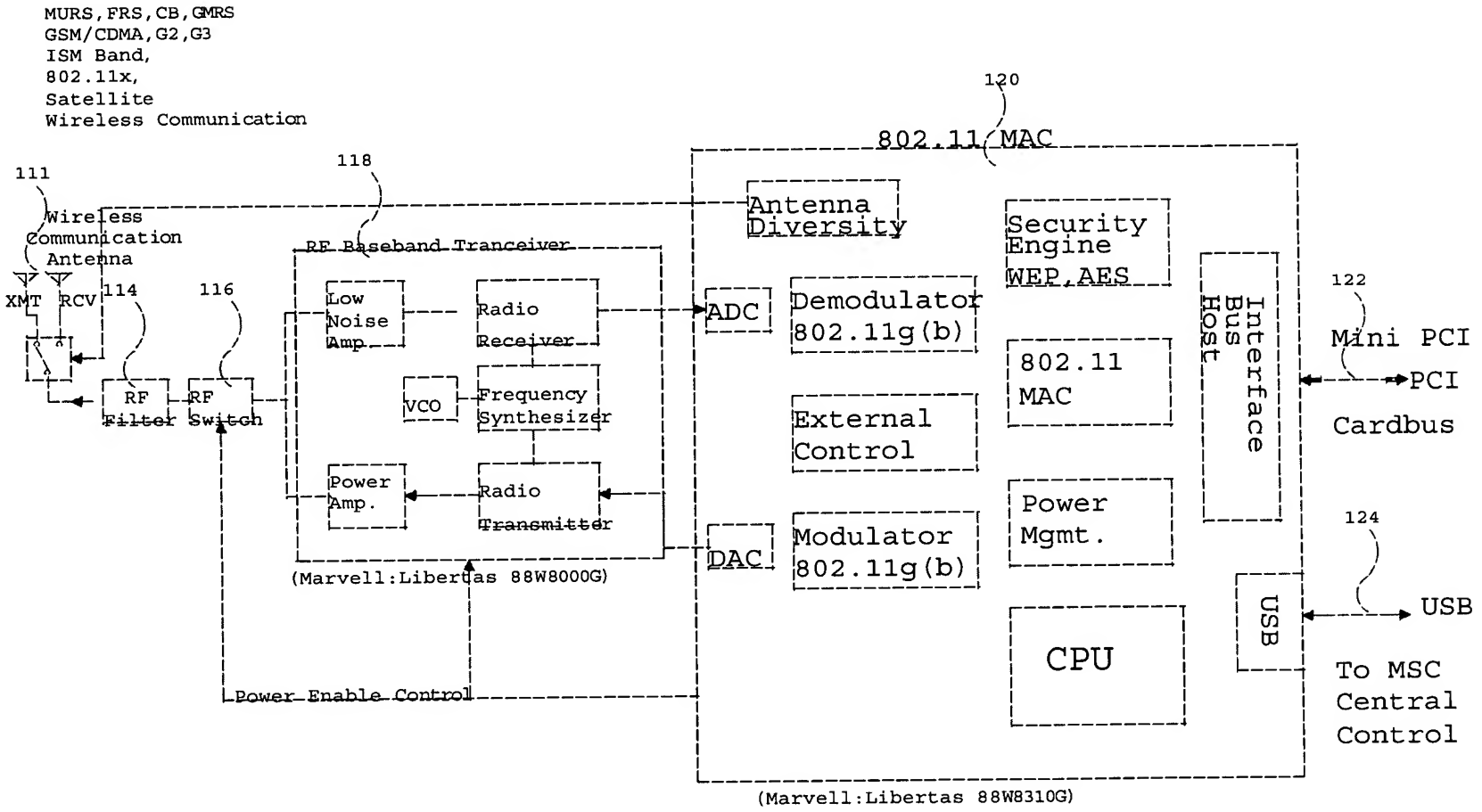
MURS, FRS, CB, GMRS
GSM/CDMA, G2, G3
ISM Band,
802.11x,
Satellite
Wireless Communication
120
802.11 MAC
111
Wireless Communication Antenna
XMT
RCV
114
116
RF Filter
RF Switch
118
RF Baseband Tranceiver
Low Noise Amp
Radio Receiver
VCO
Frequency Synthesizer
Power Amp.
Radio Transmitter
(Marvell:Libertas 88W8000G)
Power Enable Control
Antenna Diversity
ADC
DAC
Demodulator 802.11g(b)
External Control
Modulator 802.11g(b)
Security Engine WEP, AES
802.11 MAC
Power Mgmt.
CPU
Interface Bus Host
USB
(Marvell:Libertas 88W8310G)
122
Mini PCI
PCI
Cardbus
124
USB
To MSC Central Control

Fig. 2

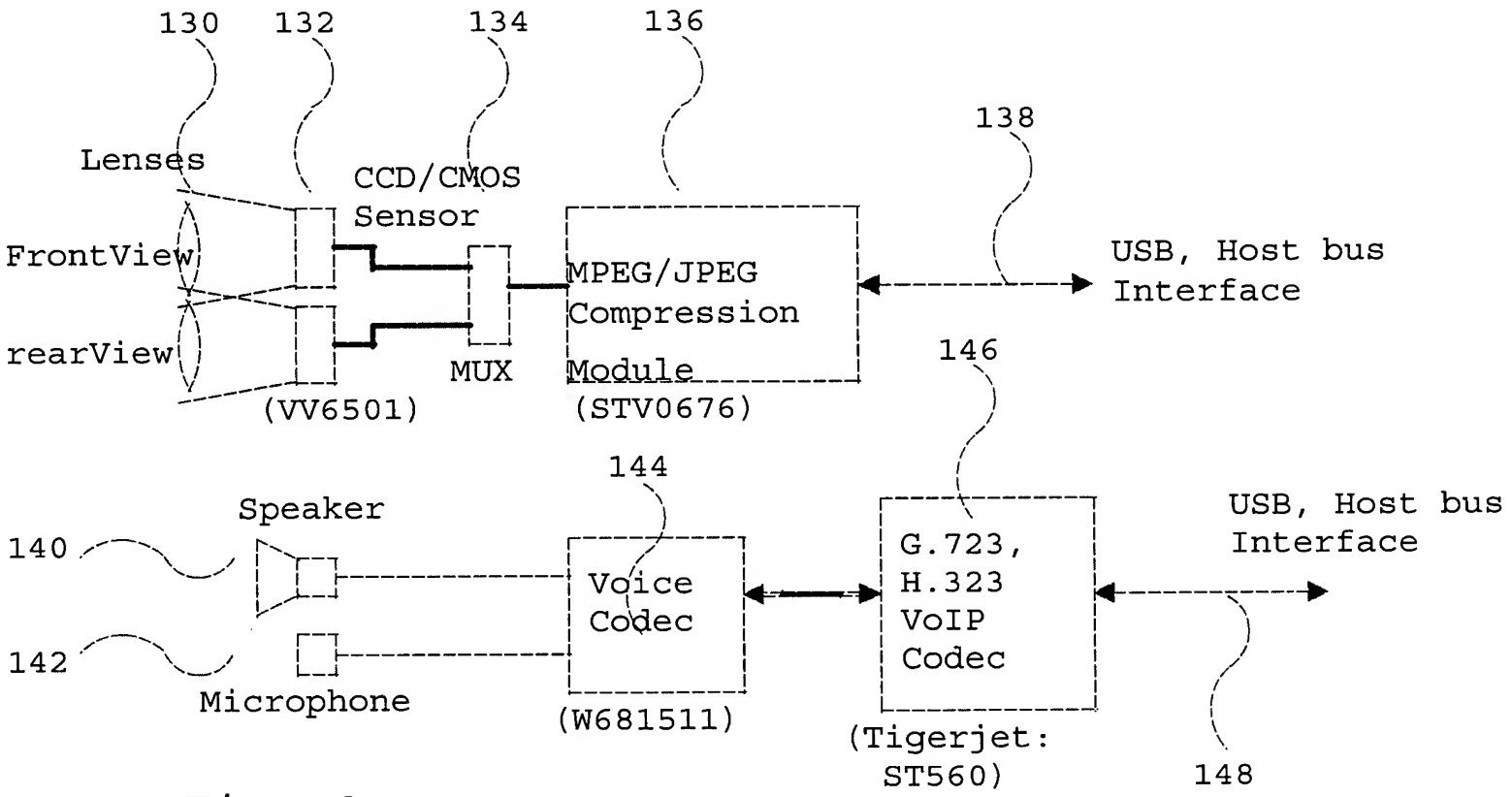
130
132
134
136
138
Lenses
CCD/CMOS
Sensor
FrontView
rearView
MUX
MPEG/JPEG
Compression
Module
(STV0676)
USB, Host bus
Interface
(VV6501)
146
144
Speaker
140
142
Microphone
Voice
Codec
(W681511)
G.723,
H.323
VoIP
Codec
(Tigerjet:
ST560)
USB, Host bus
Interface
148

Fig. 3

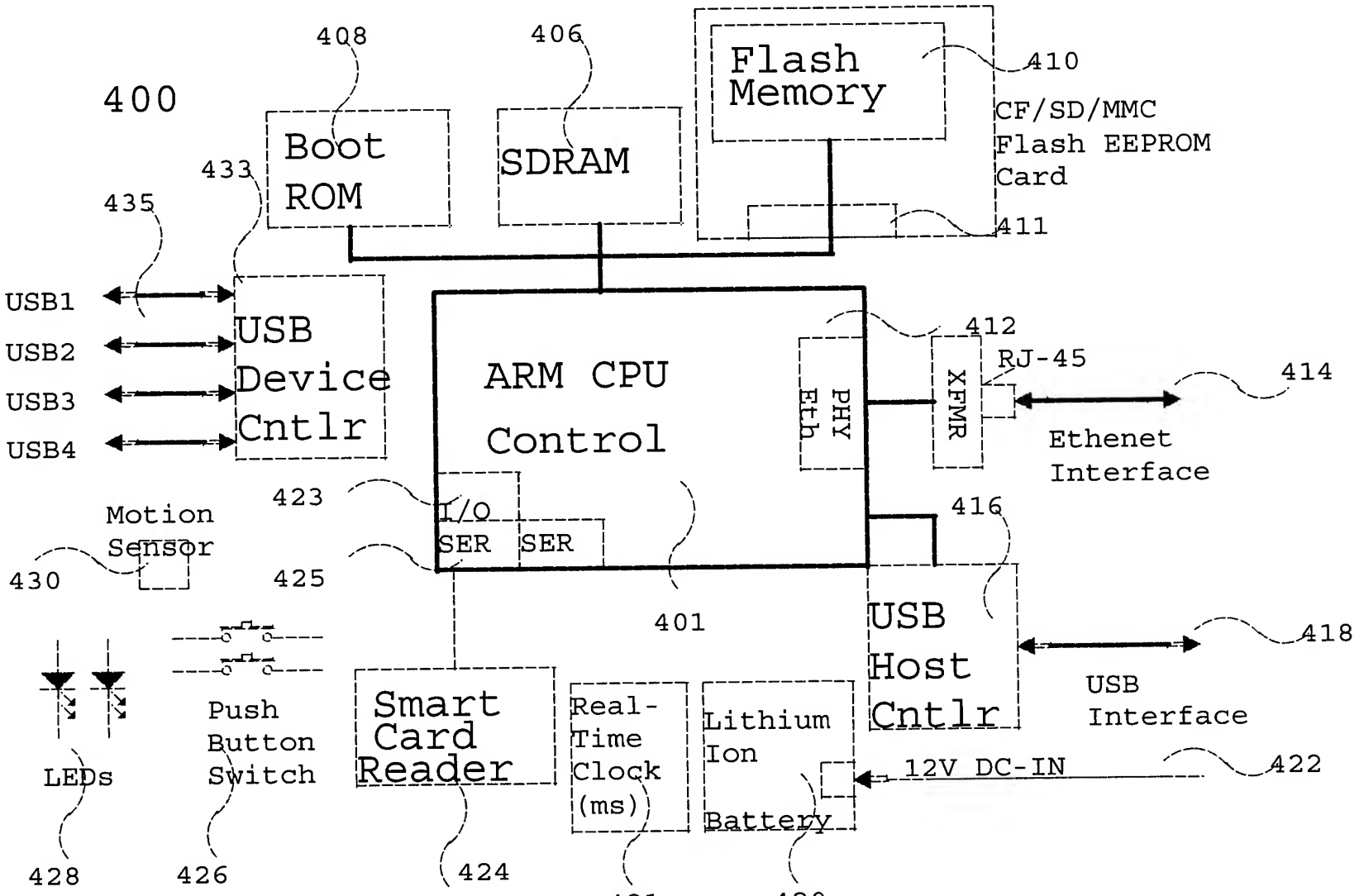
400
408
406
Flash Memory
410
CF/SD/MMC Flash EEPROM Card
Boot ROM
SDRAM
433
435
411
USB1
USB2
USB3
USB4
USB Device Cntlr
ARM CPU Control
412
Eth PHY
XFMR
RJ-45
414
Ethenet Interface
423
I/O
SER
SER
Motion Sensor
430
425
401
416
USB Host Cntlr
418
USB Interface
LEDs
Push Button Switch
Smart Card Reader
Real-Time Clock (ms)
Lithium Ion Battery
12V DC-IN
422
428
426
424
421
420

Fig. 4

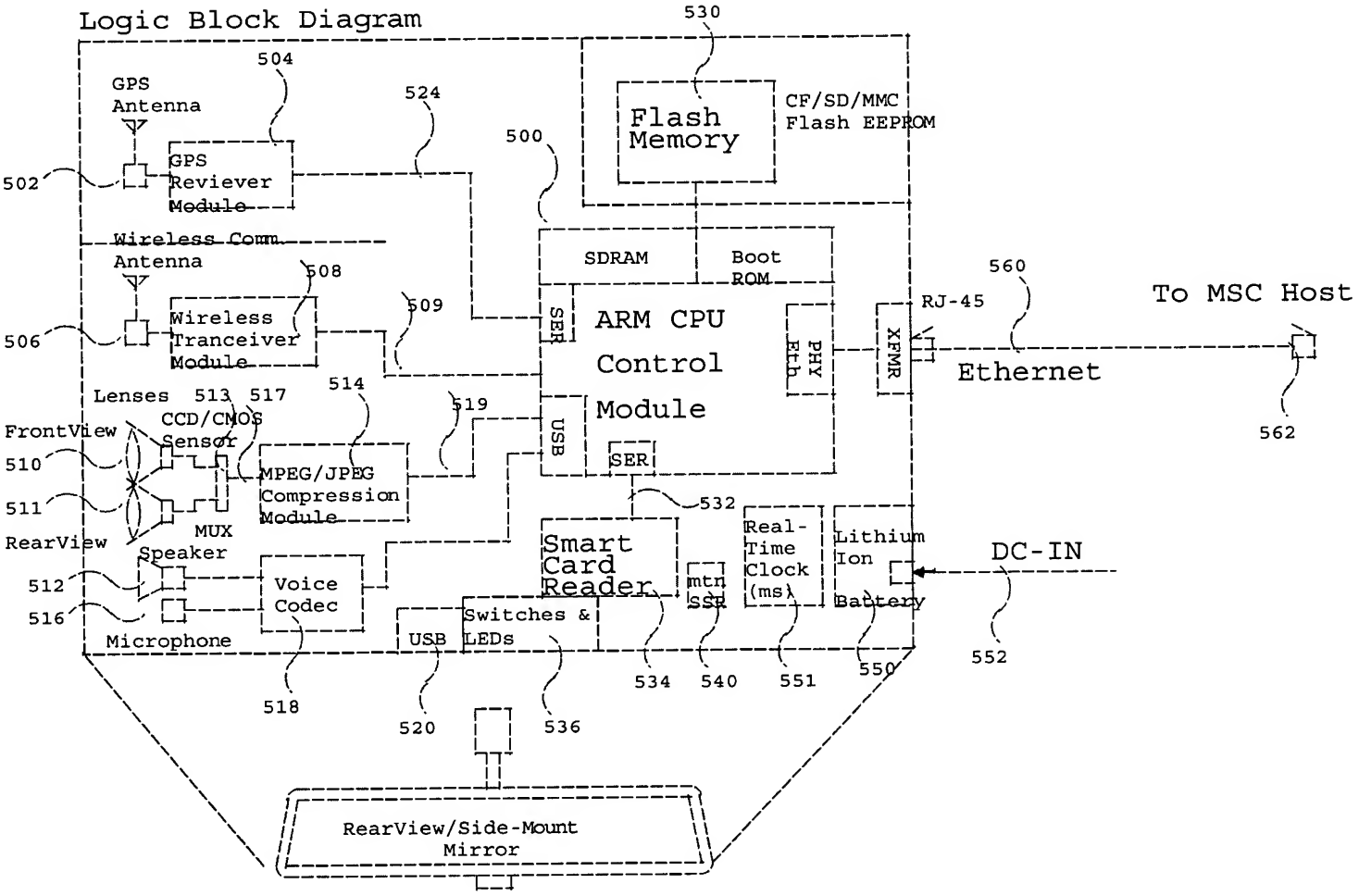
Logic Block Diagram
530
504
GPS Antenna
524
Flash Memory
CF/SD/MMC Flash EEPROM
500
GPS Reviever Module
502
Wireless Comm. Antenna
SDRAM
Boot ROM
560
RJ-45
To MSC Host
508
Wireless Tranceiver Module
509
SER
ARM CPU Control Module
PHY
XFMR
Ethernet
506
Lenses
513
517
514
519
CCD/CMOS Sensor
USB
FrontView
510
MPEG/JPEG Compression Module
SER
562
511
532
MUX
RearView
Speaker
Smart Card Reader
Real-Time Clock (ms)
Lithium Ion Battery
DC-IN
512
Voice Codec
mtn SSR
516
Switches & LEDs
USB
Microphone
534
540
551
550
552
518
520
536
RearView/Side-Mount Mirror

Fig. 5

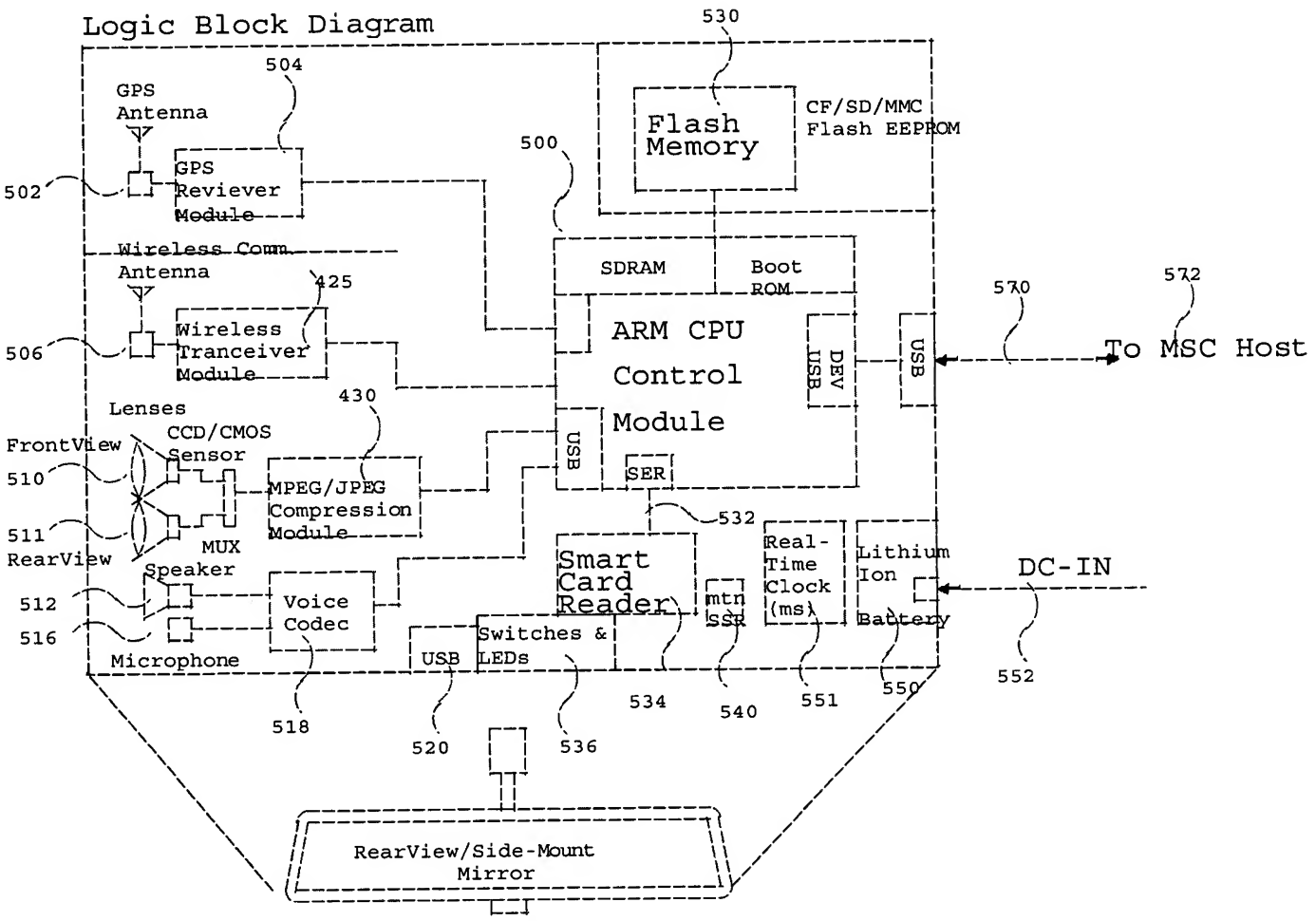
Logic Block Diagram
530
504
GPS
Antenna
Flash
Memory
CF/SD/MMC
Flash EEPROM
500
GPS
Reviever
Module
502
Wireless Comm.
Antenna
425
SDRAM
Boot
ROM
570
572
Wireless
Tranceiver
Module
506
ARM CPU
Control
Module
DEV
USB
USB
To MSC Host
Lenses
430
CCD/CMOS
Sensor
FrontView
510
USB
SER
MPEG/JPEG
Compression
Module
532
511
RearView
MUX
Speaker
Smart
Card
Reader
Real-
Time
Clock
(ms)
Lithium
Ion
Battery
DC-IN
512
516
Voice
Codec
mtn
SSR
Switches &
LEDs
USB
Microphone
534
540
551
550
552
518
520
536
RearView/Side-Mount
Mirror

Fig. 6

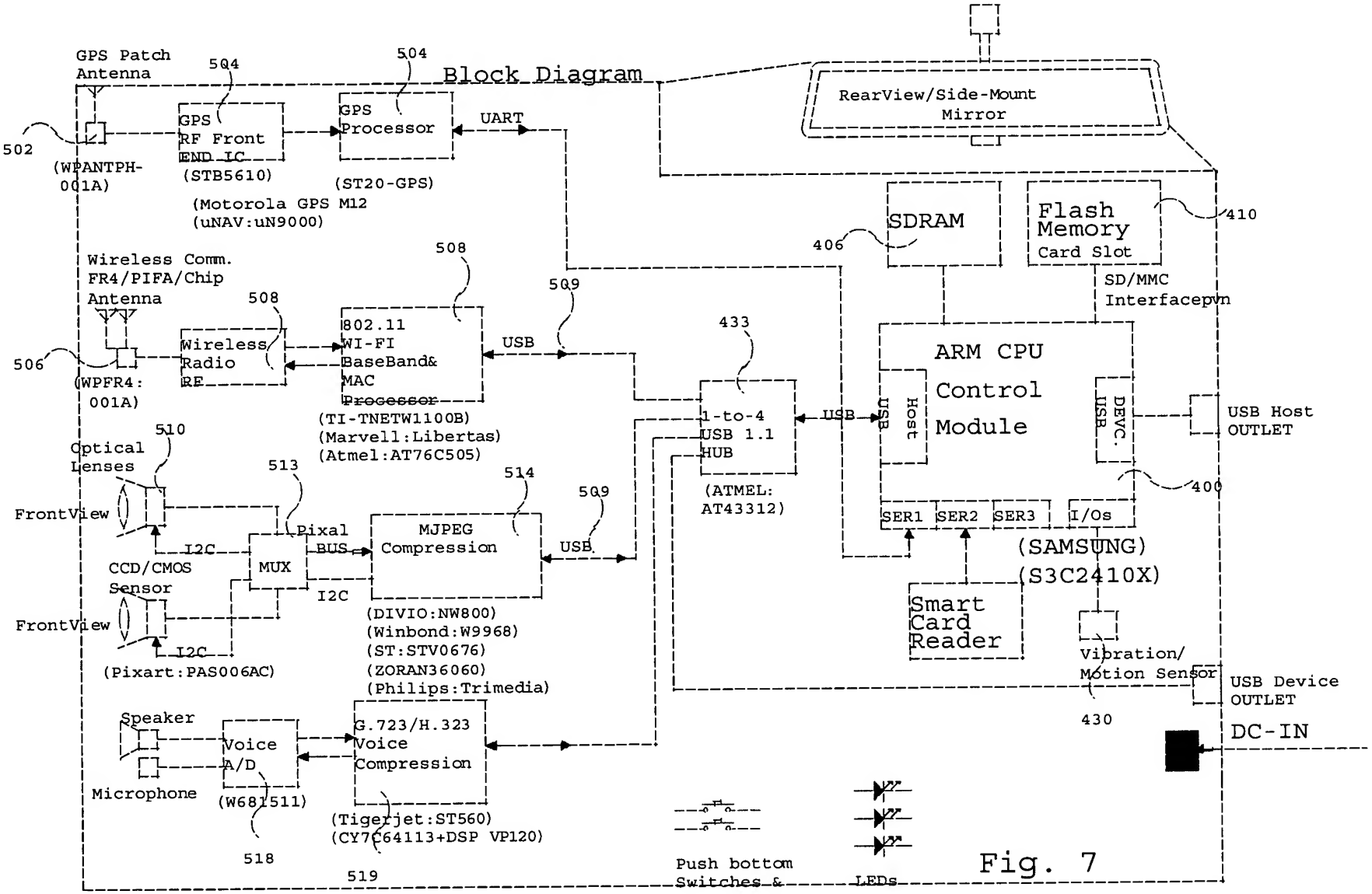
Block Diagram
GPS Patch Antenna
502
(WPANTPH-001A)
504
GPS RF Front END IC
(STB5610)
504
GPS Processor
(ST20-GPS)
UART
(Motorola GPS M12
(uNAV:uN9000)
RearView/Side-Mount Mirror
SDRAM
406
Flash Memory Card Slot
410
SD/MMC Interfacepvn
Wireless Comm. FR4/PIFA/Chip Antenna
506
(WPFR4: 001A)
508
Wireless Radio RE
508
802.11 WI-FI BaseBand& MAC Processor
(TI-TNETW1100B)
(Marvell:Libertas)
(Atmel:AT76C505)
509
USB
433
1-to-4 USB 1.1 HUB
(ATMEL: AT43312)
USB
ARM CPU Control Module
USB Host
DEVC. USB
USB Host OUTLET
400
SER1
SER2
SER3
I/Os
(SAMSUNG)
(S3C2410X)
510
Optical Lenses
FrontView
513
I2C
CCD/CMOS Sensor
MUX
Pixal BUS
514
MJPEG Compression
509
USB
I2C
FrontView
I2C
(Pixart:PAS006AC)
(DIVIO:NW800)
(Winbond:W9968)
(ST:STV0676)
(ZORAN36060)
(Philips:Trimedia)
Smart Card Reader
Vibration/ Motion Sensor
430
USB Device OUTLET
DC-IN
Speaker
Microphone
Voice A/D
(W681511)
518
G.723/H.323 Voice Compression
(Tigerjet:ST560)
(CY7C64113+DSP VP120)
519
Push bottom Switches &
LEDs

Fig. 7

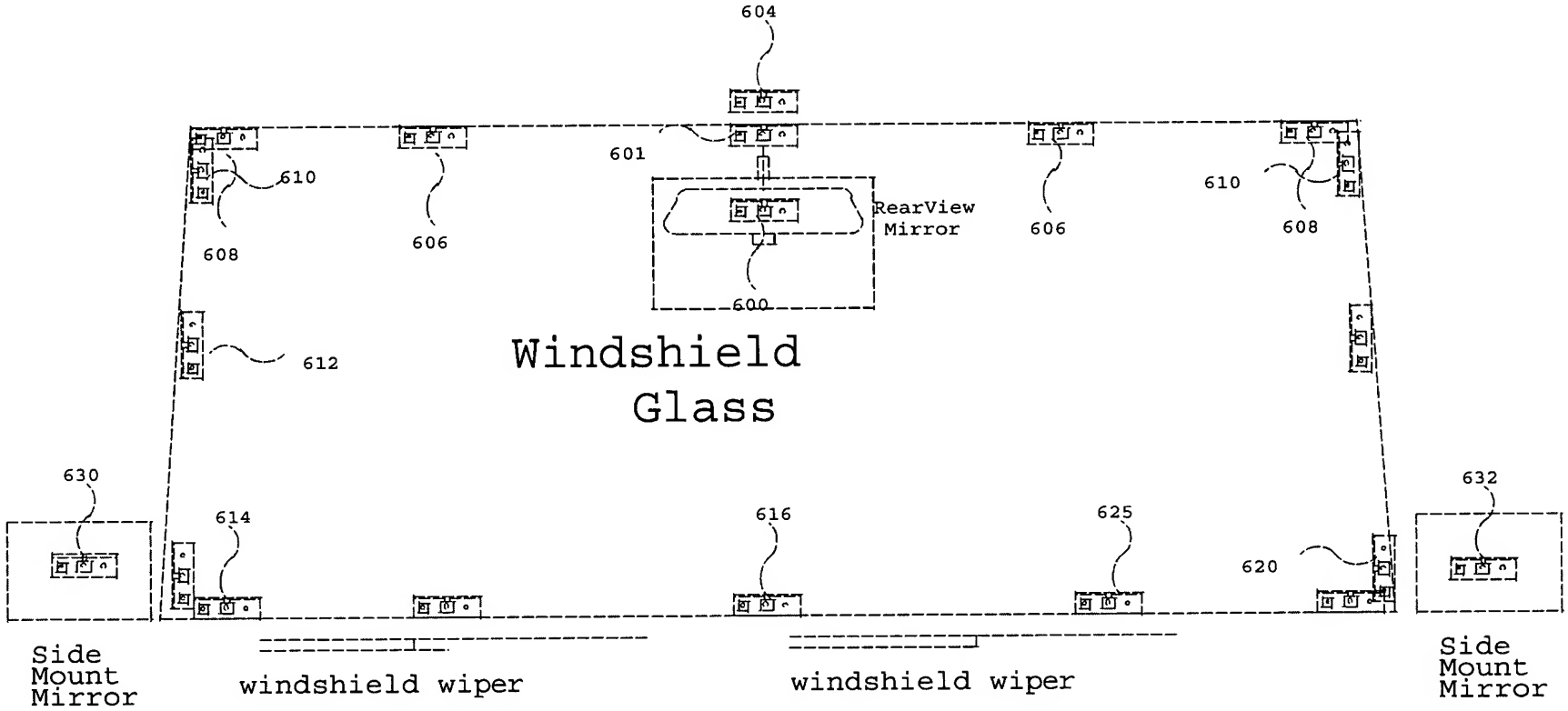
604
601
610
608
606
RearView
Mirror
606
610
608
600
612
Windshield
Glass
630
614
616
625
620
632
Side
Mount
Mirror
windshield wiper
windshield wiper
Side
Mount
Mirror

Fig. 8

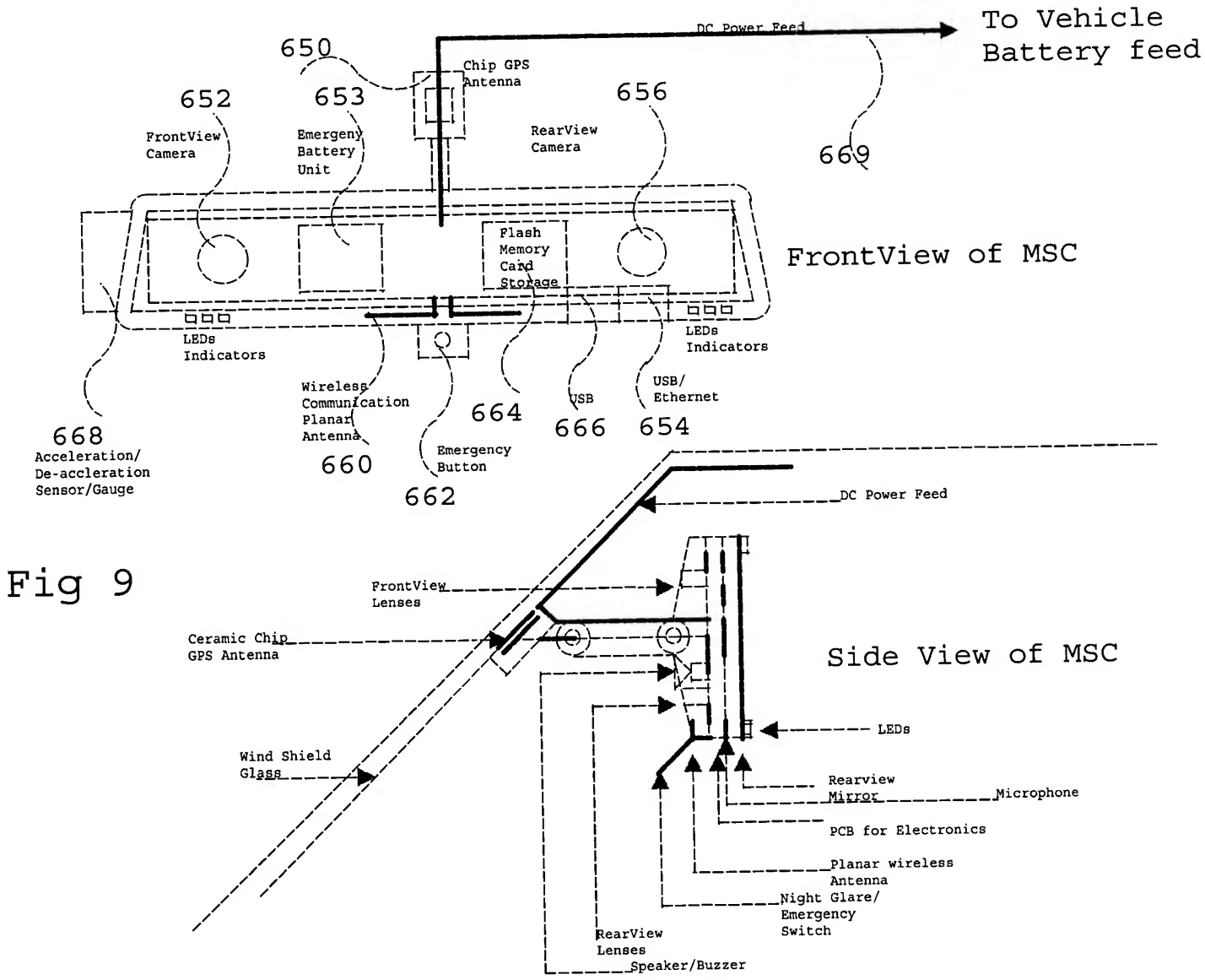
To Vehicle
Battery feed
DC Power Feed
650
Chip GPS
Antenna
652
653
656
669
FrontView
Camera
Emergeny
Battery
Unit
RearView
Camera
Flash
Memory
Card
Storage
FrontView of MSC
LEDs
Indicators
LEDs
Indicators
Wireless
Communication
Planar
Antenna
USB/
Ethernet
668
Acceleration/
De-accleration
Sensor/Gauge
660
Emergency
Button
662
664
USB
666
654
DC Power Feed
FrontView
Lenses
Ceramic Chip
GPS Antenna
Side View of MSC
LEDs
Wind Shield
Glass
Rearview
Mirror
Microphone
PCB for Electronics
Planar wireless
Antenna
Night Glare/
Emergency
Switch
RearView
Lenses
Speaker/Buzzer

Fig 9

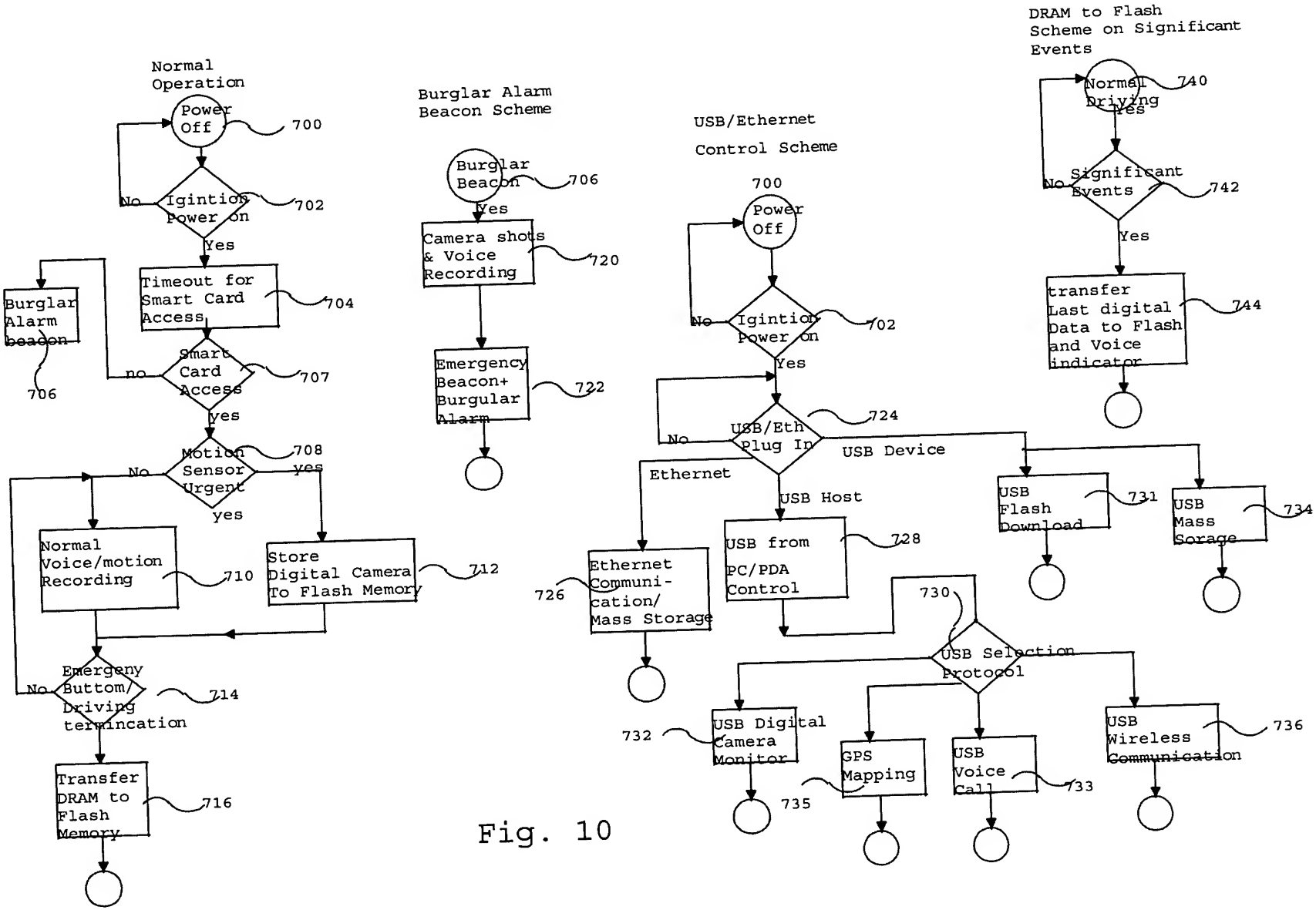
Normal Operation
Power Off
700
No
Igintion Power on
702
Yes
Timeout for Smart Card Access
704
Burglar Alarm beacon
706
no
Smart Card Access
707
yes
Motion Sensor Urgent
708
No
yes
yes
Normal Voice/motion Recording
710
Store Digital Camera To Flash Memory
712
Emergeny Buttom/ Driving termination
No
714
Transfer DRAM to Flash Memory
716
Burglar Alarm Beacon Scheme
Burglar Beacon
706
Yes
Camera shots & Voice Recording
720
Emergency Beacon+ Burgular Alarm
722
USB/Ethernet Control Scheme
700
Power Off
No
Igintion Power on
702
Yes
No
USB/Eth Plug In
724
USB Device
Ethernet
USB Host
Ethernet Communi- cation/ Mass Storage
726
USB from PC/PDA Control
728
730
USB Selection Protocol
USB Digital Camera Monitor
732
735
GPS Mapping
USB Voice Call
733
USB Wireless Communication
736
USB Flash Download
731
USB Mass Sorage
734
DRAM to Flash Scheme on Significant Events
Normal Driving
740
Yes
No
Significant Events
742
Yes
transfer Last digital Data to Flash and Voice indicator
744

Fig. 10

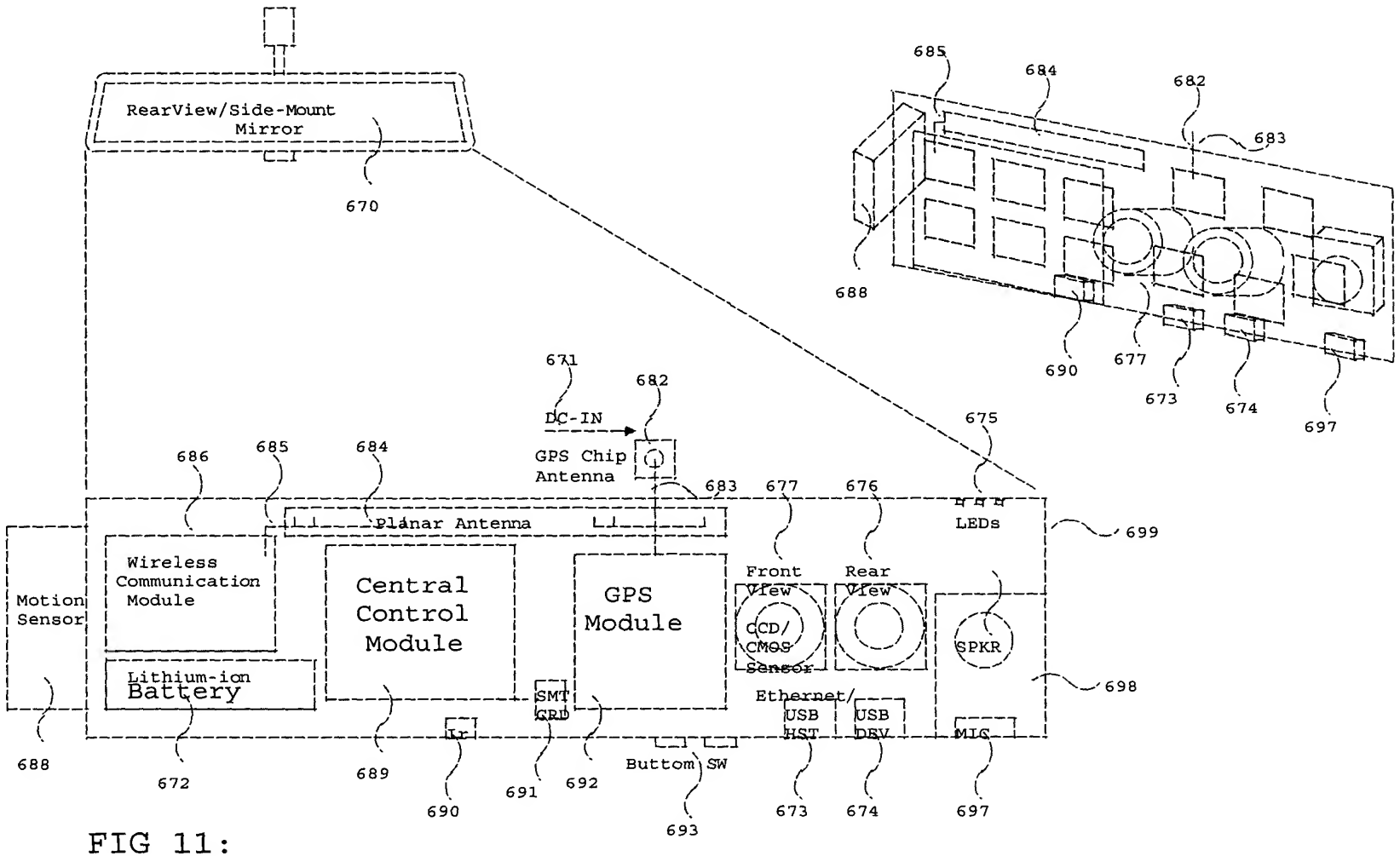
RearView/Side-Mount Mirror
670
685
684
682
683
688
690
677
673
674
697
671
682
DC-IN
GPS Chip Antenna
675
686
685
684
683
677
676
LEDs
699
Planar Antenna
Wireless Communication Module
Central Control Module
GPS Module
Front View
Rear View
Motion Sensor
CCD/ CMOS Sensor
SPKR
Lithium-ion Battery
SMT GPD
Ethernet/ USB HST
USB DEV
698
Ir
Buttom SW
MIC
688
672
689
690
691
692
693
673
674
697

FIG 11:

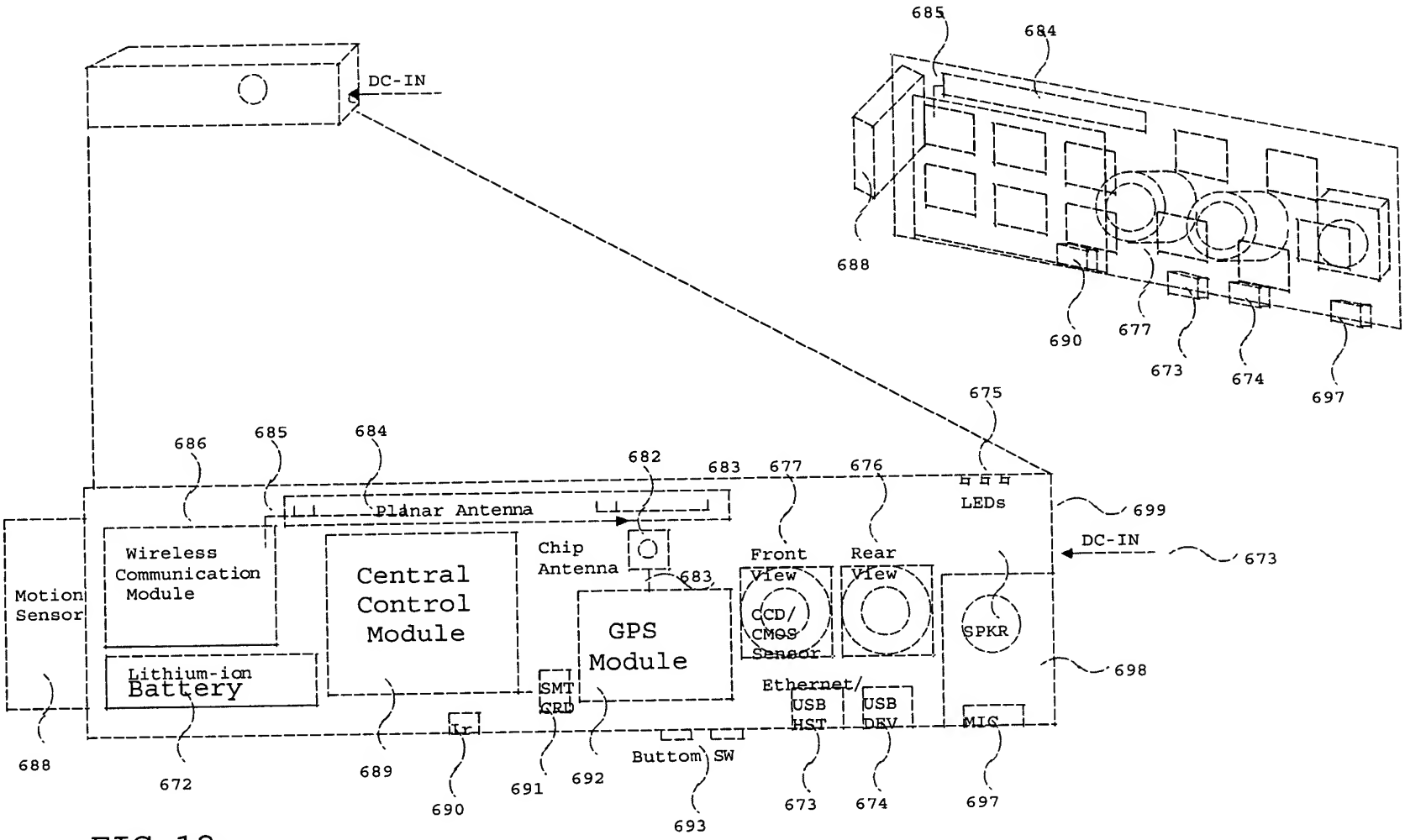
685
684
DC-IN
688
690
677
673
674
697
675
686
685
684
682
683
677
676
LEDs
699
Planar Antenna
DC-IN
673
Wireless Communication Module
Central Control Module
Chip Antenna
683
Front View
Rear View
Motion Sensor
GPS Module
CCD/ CMOS Sensor
SPKR
698
Lithium-ion Battery
SMT GRD
Ethernet/ USB HST
USB DEV
MIC
Ir
Buttom SW
688
672
689
690
691
692
693
673
674
697

FIG 12:

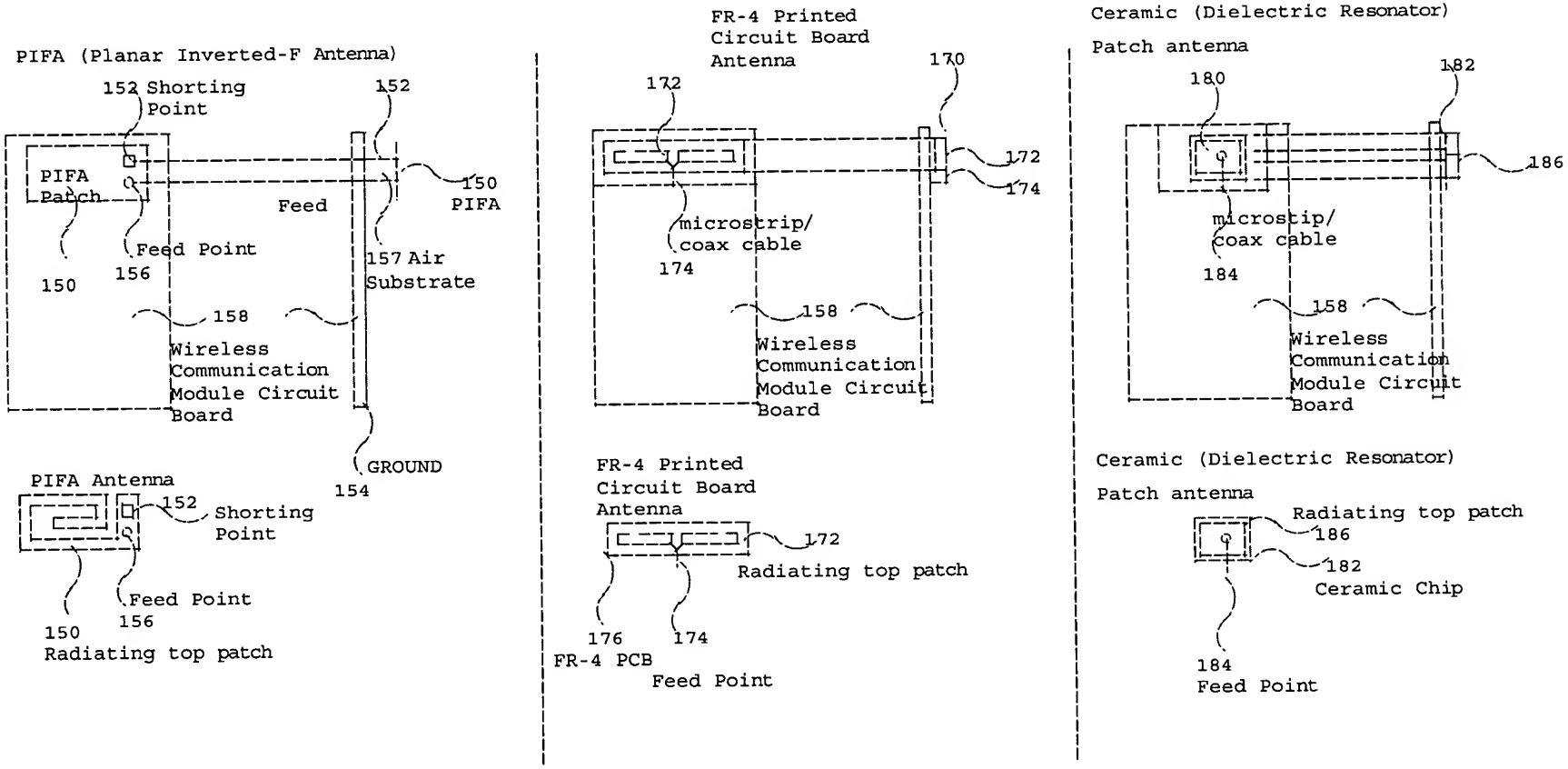
PIFA (Planar Inverted-F Antenna)
152 Shorting Point
152
PIFA Patch
150 PIFA
Feed
Feed Point
156
150
157 Air Substrate
158
Wireless Communication Module Circuit Board
GROUND
154
PIFA Antenna
152
Shorting Point
Feed Point
156
150
Radiating top patch
FR-4 Printed Circuit Board Antenna
170
172
172
174
microstrip/ coax cable
174
158
Wireless Communication Module Circuit Board
FR-4 Printed Circuit Board Antenna
172
Radiating top patch
176
174
FR-4 PCB
Feed Point
Ceramic (Dielectric Resonator) Patch antenna
180
182
186
microstip/ coax cable
184
158
Wireless Communication Module Circuit Board
Ceramic (Dielectric Resonator) Patch antenna
Radiating top patch
186
182
Ceramic Chip
184
Feed Point

Fig.13

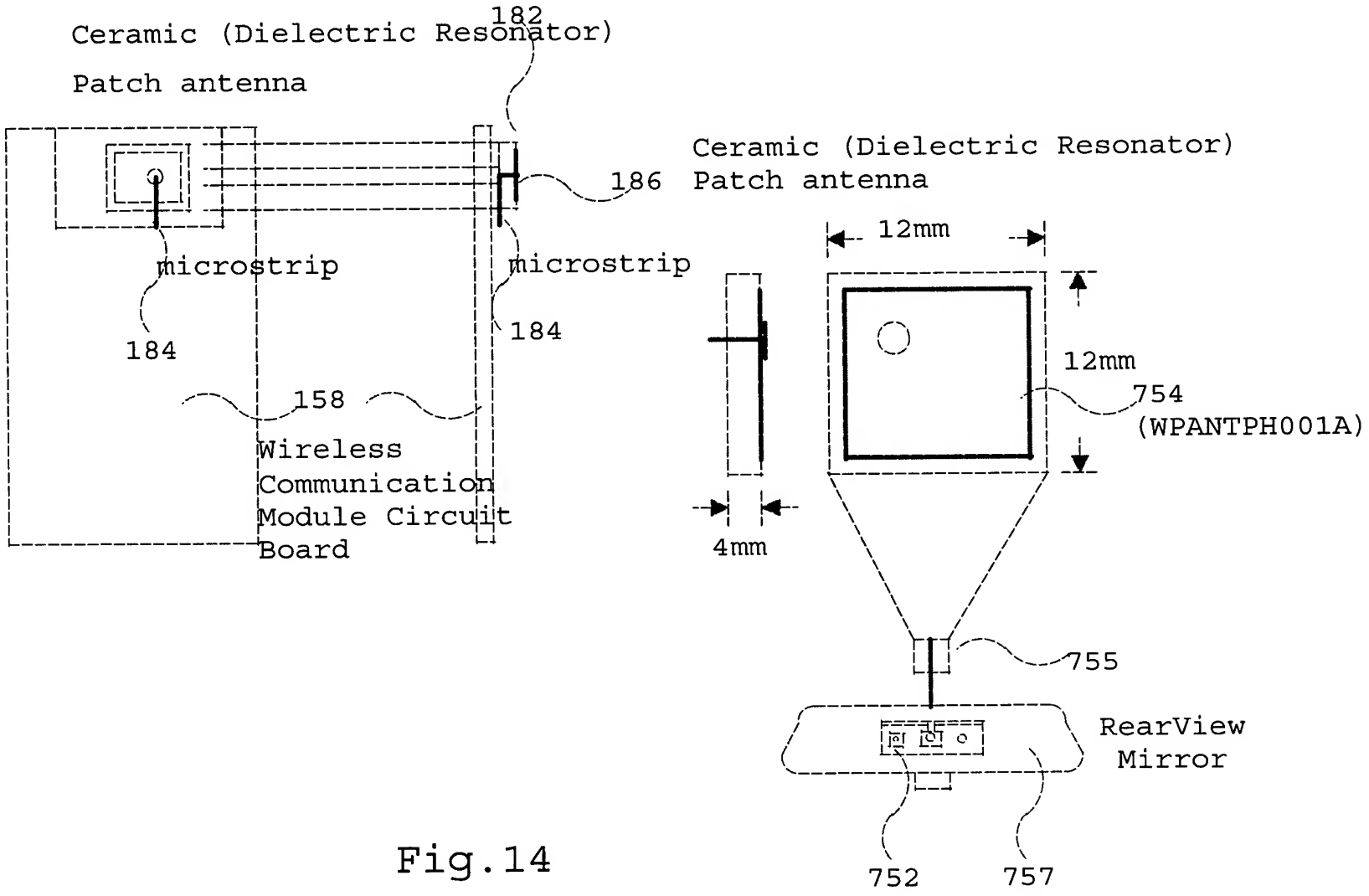
Ceramic (Dielectric Resonator)
Patch antenna
182
186
microstrip
184
microstrip
184
158
Wireless
Communication
Module Circuit
Board
Ceramic (Dielectric Resonator)
Patch antenna
12mm
12mm
754
(WPANTPH001A)
4mm
755
RearView
Mirror
752
757

Fig.14

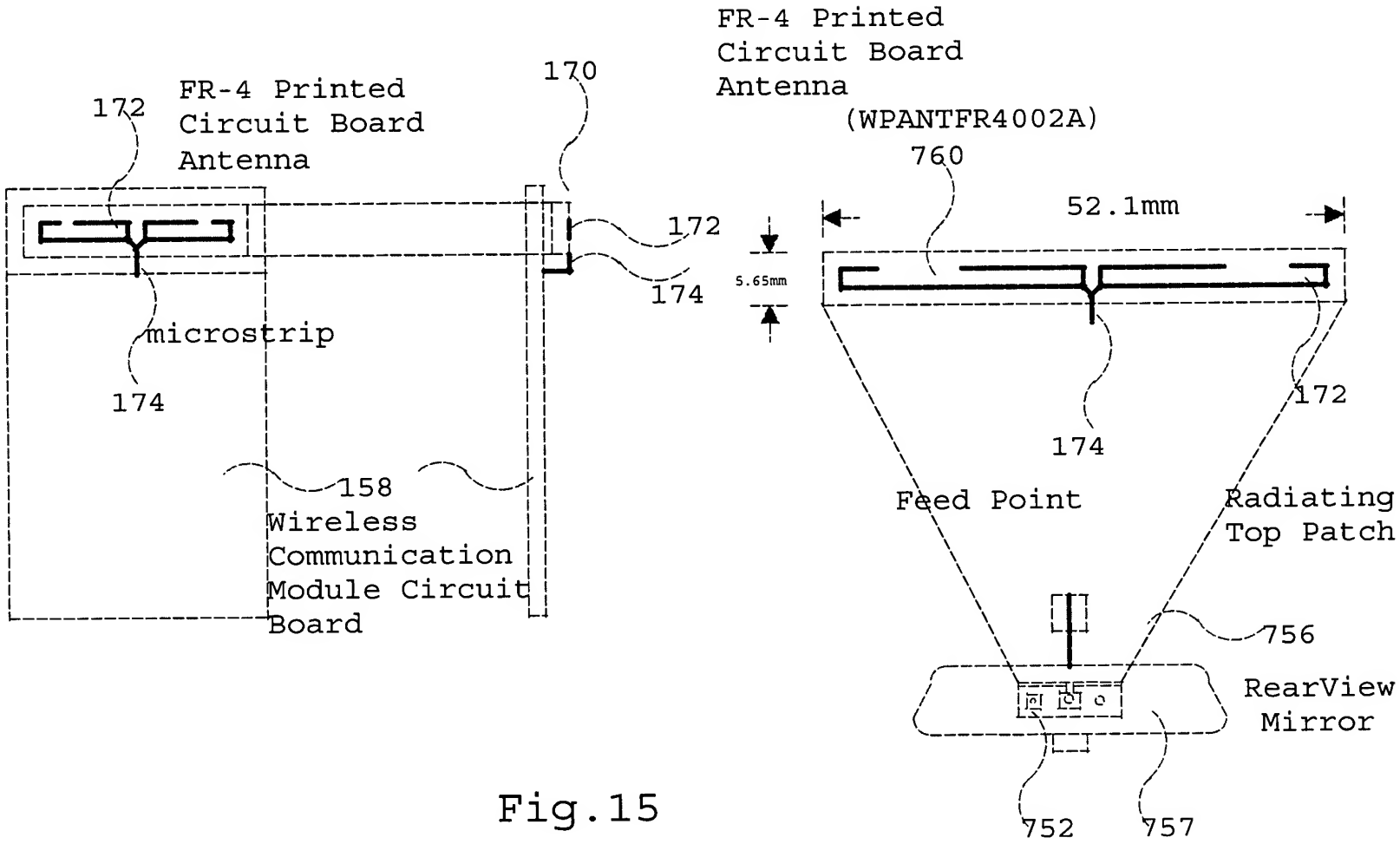
FR-4 Printed
Circuit Board
Antenna
172
170
172
174
microstrip
174
158
Wireless
Communication
Module Circuit
Board
FR-4 Printed
Circuit Board
Antenna
(WPANTFR4002A)
760
52.1mm
5.65mm
174
172
Feed Point
Radiating
Top Patch
756
RearView
Mirror
752
757

Fig.15

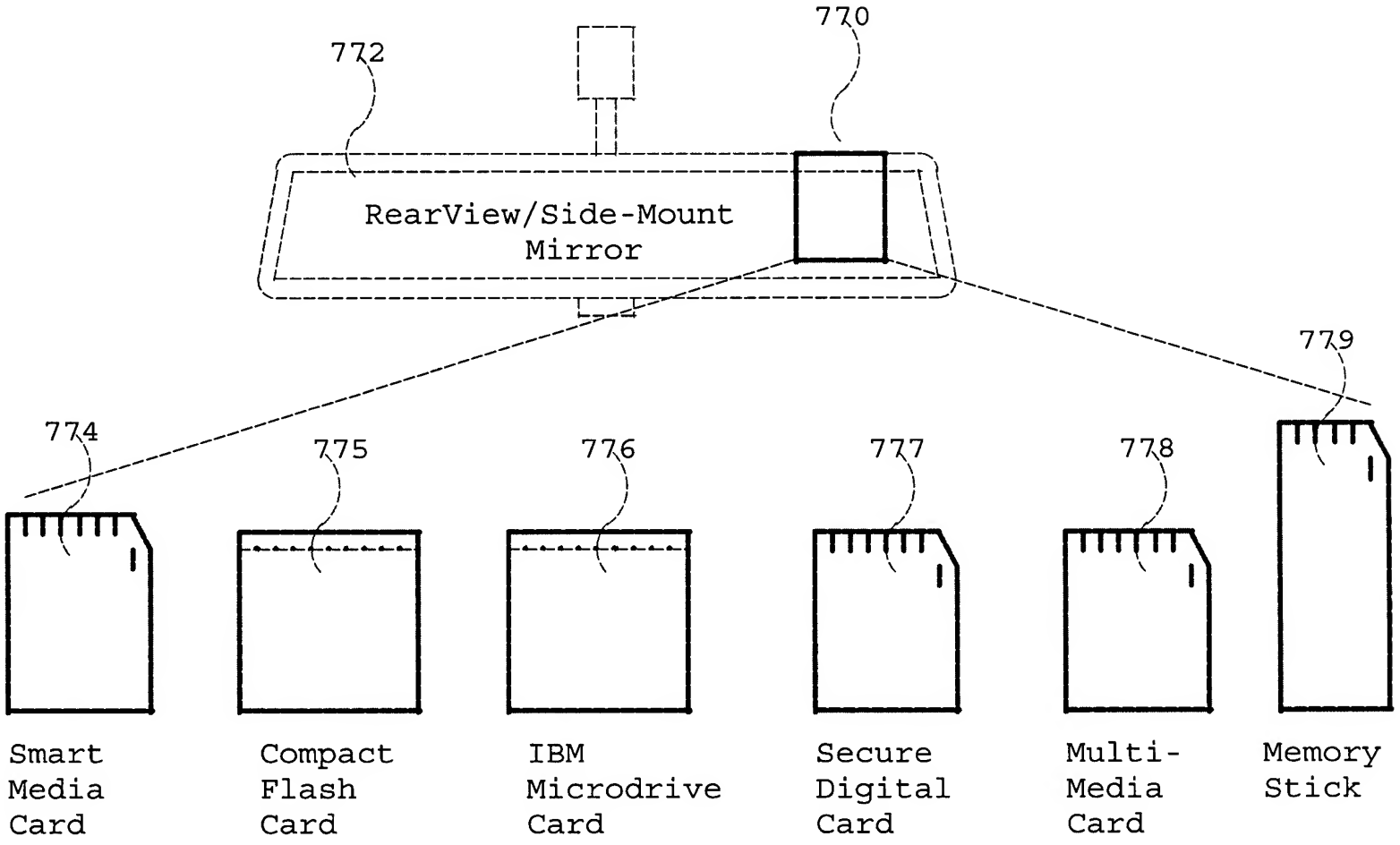
770
772
RearView/Side-Mount
Mirror
779
774
775
776
777
778
Smart
Media
Card
Compact
Flash
Card
IBM
Microdrive
Card
Secure
Digital
Card
Multi-
Media
Card
Memory
Stick

Fig.16

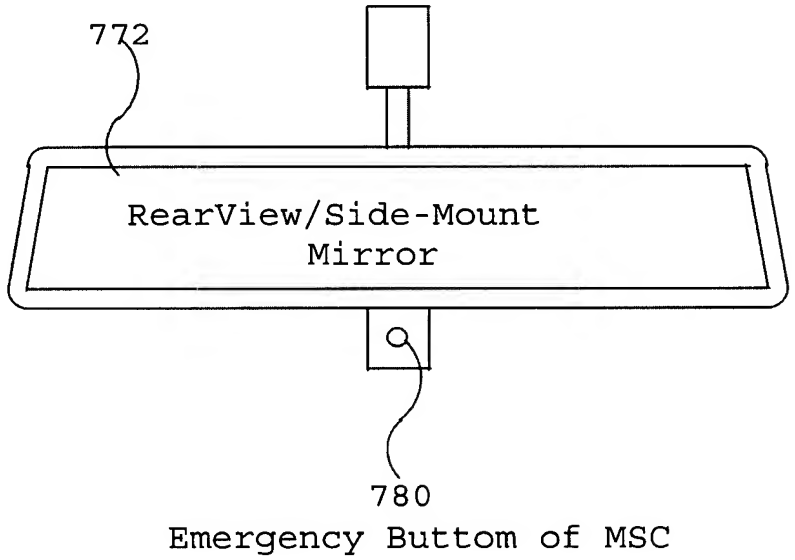

Fig.17

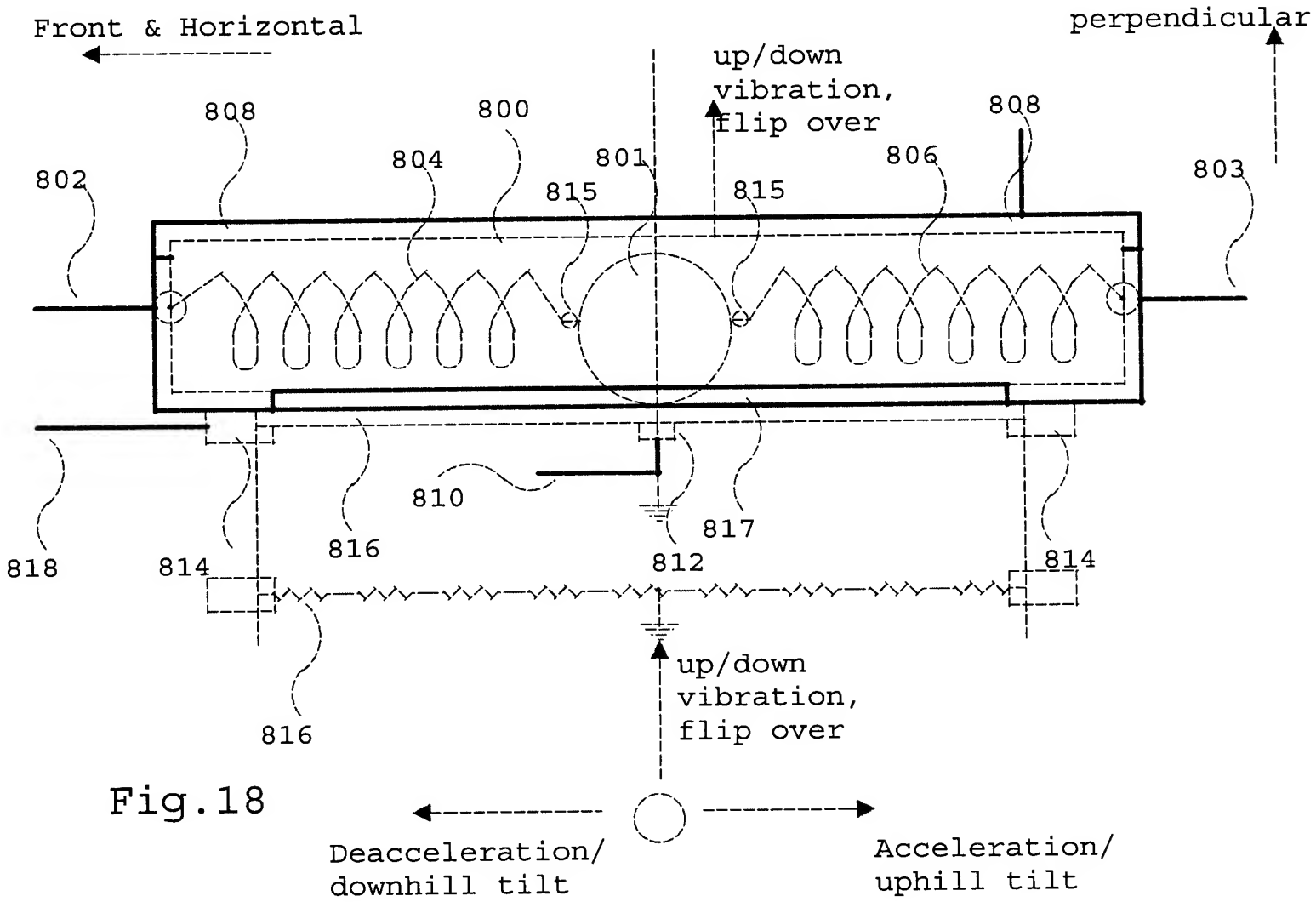
Front & Horizontal
perpendicular
up/down
vibration,
flip over
808
800
804
801
806
808
802
815
815
803
818
814
816
810
817
812
814
816
up/down
vibration,
flip over
Deacceleration/
downhill tilt
Acceleration/
uphill tilt

Fig.18

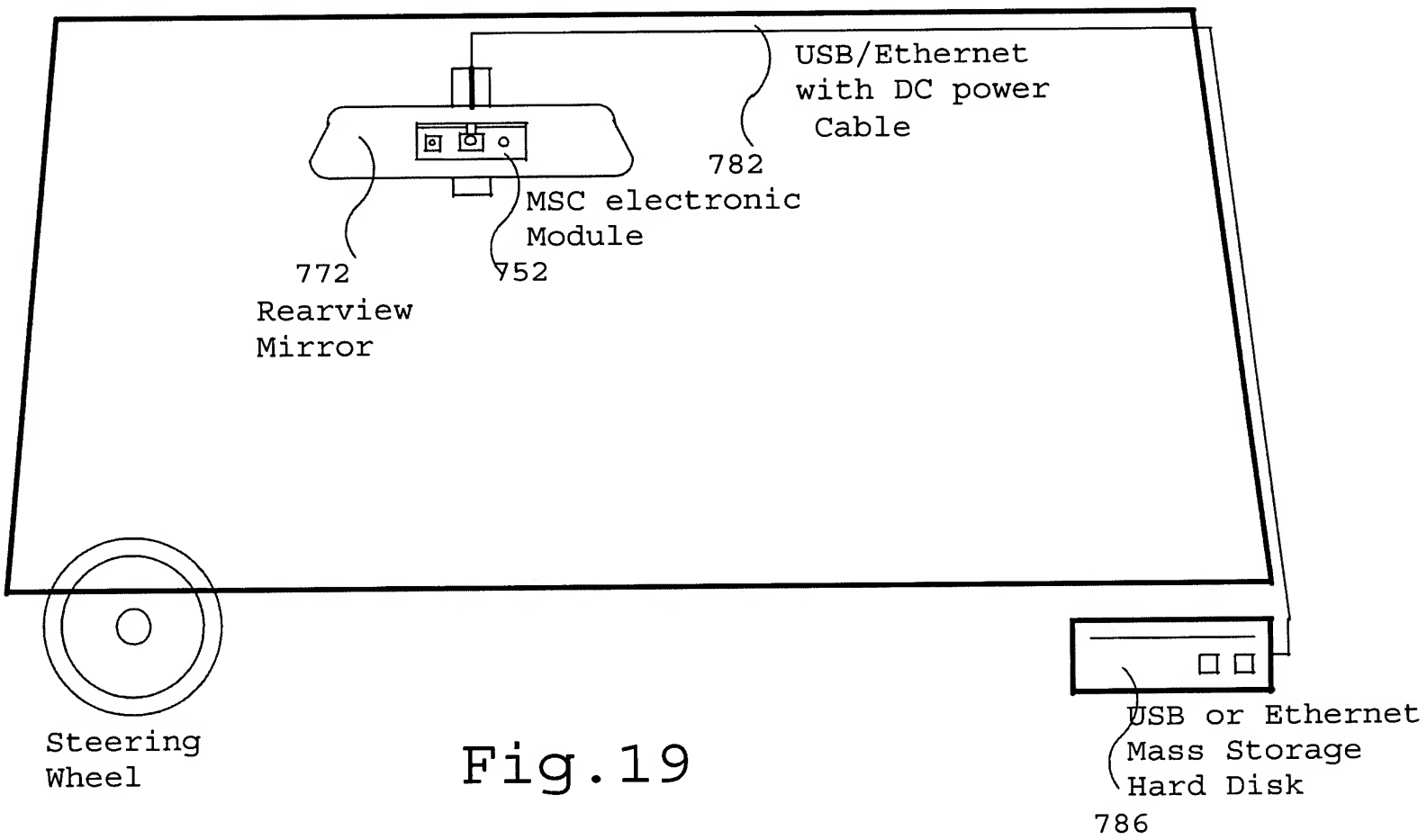
USB/Ethernet
with DC power
Cable
782
MSC electronic
Module
772
Rearview
Mirror
752
Steering
Wheel
USB or Ethernet
Mass Storage
Hard Disk
786

Fig.19

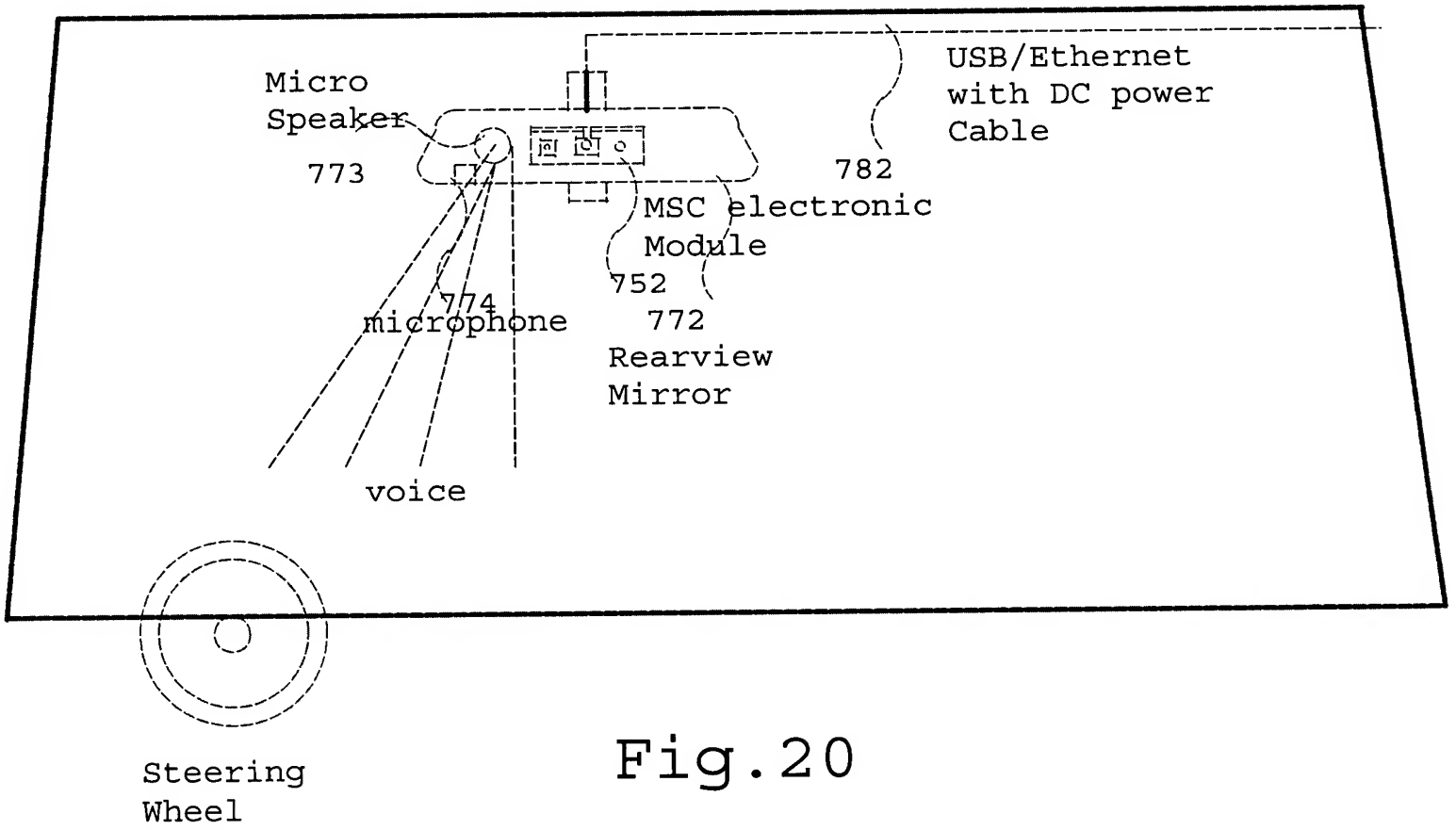
Micro
Speaker
773
USB/Ethernet
with DC power
Cable
782
MSC electronic
Module
752
772
Rearview
Mirror
774
microphone
voice
Steering
Wheel

Fig.20

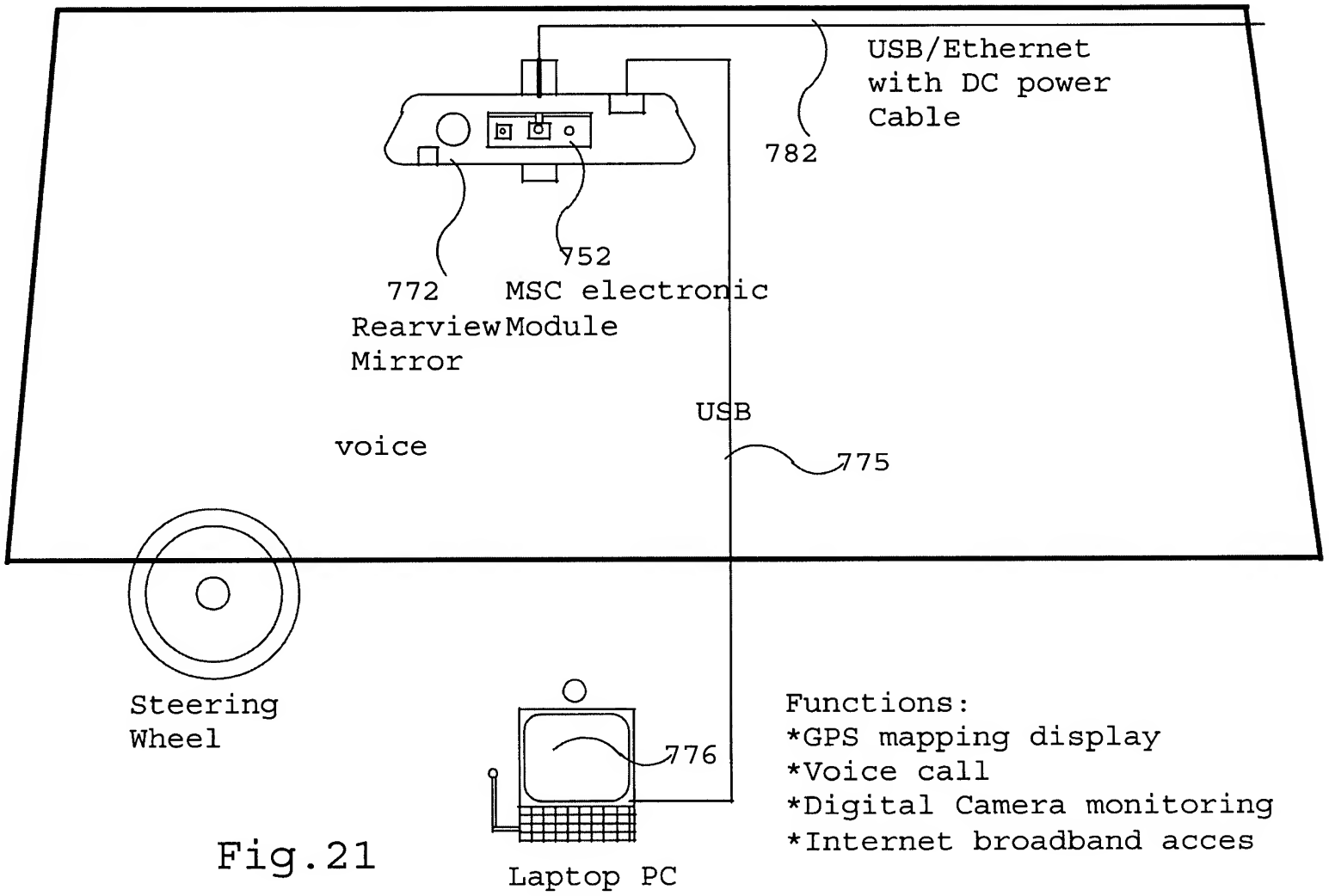
USB/Ethernet
with DC power
Cable
782
752
772
MSC electronic
Module
Rearview
Mirror
USB
voice
775
Steering
Wheel
776
Laptop PC
Functions:
*GPS mapping display
*Voice call
*Digital Camera monitoring
*Internet broadband acces

Fig.21

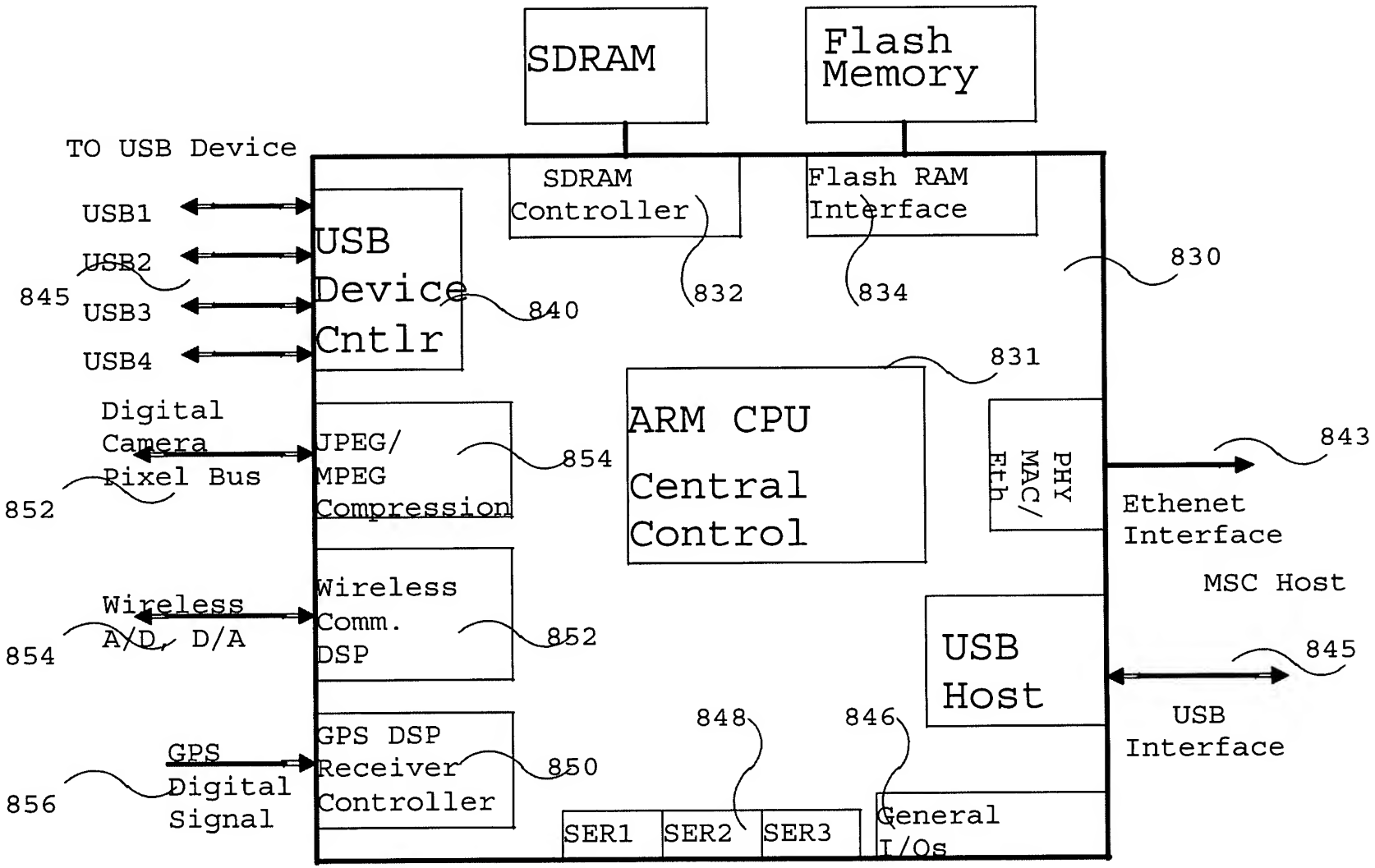
SDRAM
Flash Memory
TO USB Device
SDRAM Controller
Flash RAM Interface
USB1
USB2
USB3
USB4
USB Device Cntlr
845
840
832
834
830
831
Digital Camera Pixel Bus
852
JPEG/ MPEG Compression
854
ARM CPU Central Control
PHY MAC/ Eth
843
Ethenet Interface
MSC Host
Wireless A/D, D/A
854
Wireless Comm. DSP
852
USB Host
845
USB Interface
GPS Digital Signal
856
GPS DSP Receiver Controller
850
848
846
SER1
SER2
SER3
General I/Os

Fig.22

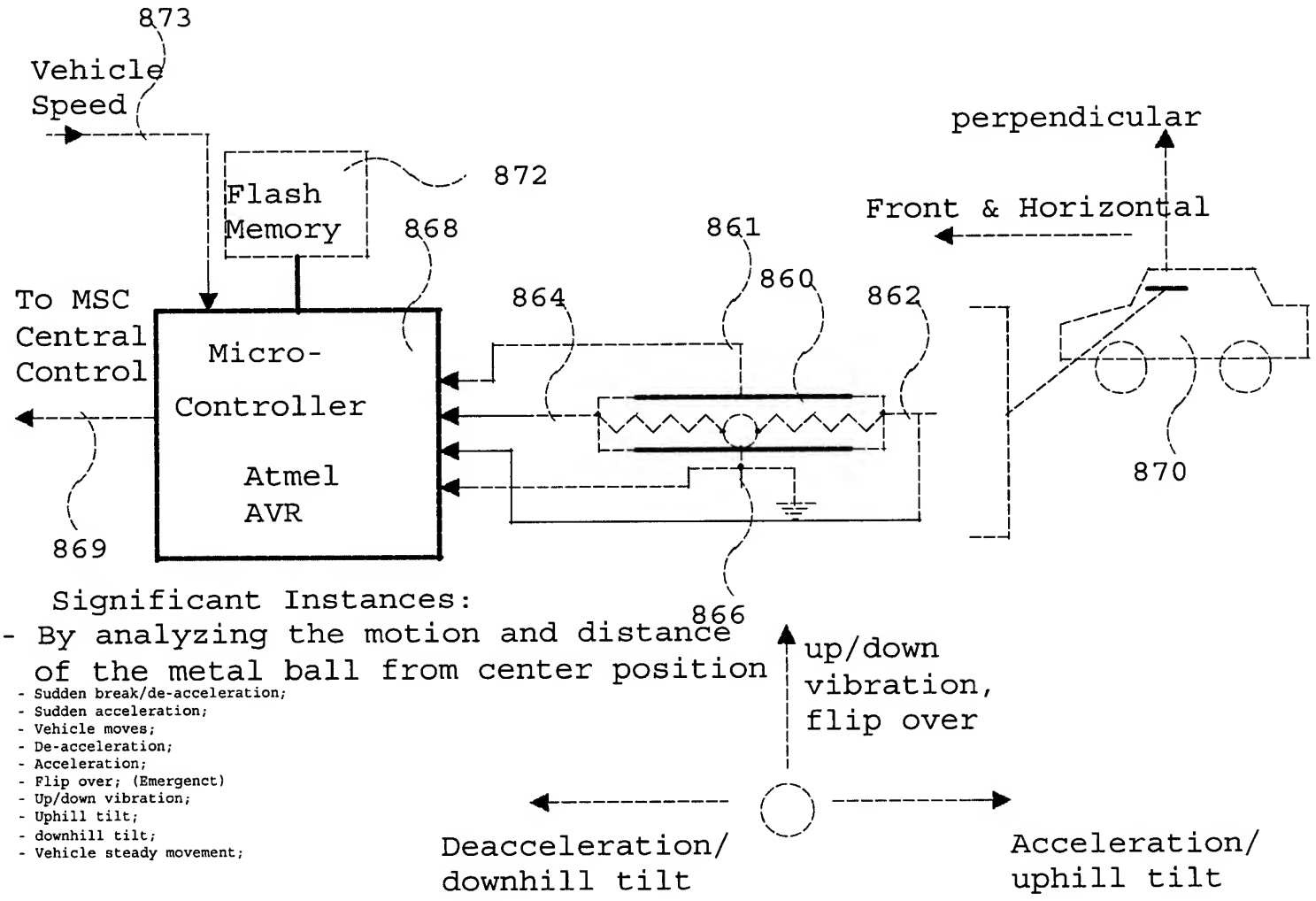
873
Vehicle Speed
872
Flash Memory
868
861
860
862
perpendicular
Front & Horizontal
To MSC Central Control
Micro-Controller
Atmel AVR
864
870
869
866
Significant Instances:
- By analyzing the motion and distance of the metal ball from center position
- Sudden break/de-acceleration;
- Sudden acceleration;
- Vehicle moves;
- De-acceleration;
- Acceleration;
- Flip over; (Emergenct)
- Up/down vibration;
- Uphill tilt;
- downhill tilt;
- Vehicle steady movement;
up/down vibration, flip over
Deacceleration/ downhill tilt
Acceleration/ uphill tilt

Fig.23